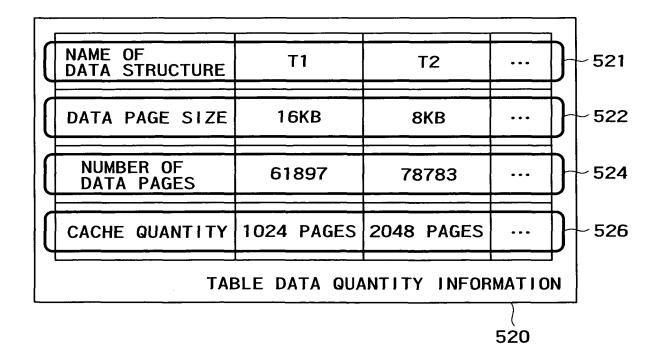


I											
		RMATION OF JRE	INTER- STRUCTURAL AREA	0-10239	0-10239	10240-20479	10240-20479	0-10239	0-10239		AREA MAPPING INFORMATION
310		G AREA INFO	MANAGEMENT STRUCTURE ID	Lower0	Lower1	Lower0	Lower1	Lower0	Lower1		AREA MAPPING
31		CORRESPONDIN LOWER MANAGE	VIRTUALIZING MACHANISM ID	LowApp0	LowApp1	LowApp0	LowApp1	LowApp2	LowApp2		
5		ATION OF AL STRUCTURE	INTER- STRUCTURAL AREA	0-10239	10240-20479	0-10239	10240-20479	0-10239	10240-20479		
312		AREA INFORM UPPER VIRTU	VIRTUAL STRUCTURE ID		upperu		Upper1				
	312 314 310	314	314 STA CORRESPONDING AREA I CORRESPOND STRUCTURE LOWER MANAGEMENT STR	312 NFORMATION OF CORRESPONDING AREA INFORVIRTUAL STRUCTURE VIRTUALIZING MANAGEMENT STRUCTURE STRUCTURE ID ID ID AL	312 NFORMATION OF CORRESPONDING AREA INFORVIRTUAL STRUCTURE CORRESPONDING AREA INFORMACHANISM STRUCTURE CORRESPONDING AREA INFORMACHANISM STRUCTURE CORRESPONDING AREA CONTRACTOR CORRESPONDING AREA CONTRACTOR	312 NFORMATION OF CORRESPONDING AREA INFORVIRTUAL STRUCTURE CORRESPONDING AREA INFORMACHANISM STRUCTURE ID CORRESPONDING AREA INFORMACHANISM STRUCTURE ID COMMACHANISM ID COMPONDING AREA COMMACHANISM ID COMPONDING AREA COM	312 314 310 NFORMATION OF VIRTUALIZING MANAGEMENT TURE STRUCTURAL NINTER- N	312 314 310	312 NFORMATION OF VIRTUAL STRUCTURE LOWER MANAGEMENT STRUCTURE LOWER MANAGEMENT STRUCTURE LOWADDO LOWADDO	312 NFORMATION OF CORRESPONDING AREA INFORMATION OF LOWER MANAGEMENT STRUCTURE INTER- TURE STRUCTURAL VIRTUALIZING MANAGEMENT STRUCTURE ID D D NO 10240-20479 LowApp1 Lower1 NO 10240-20479 LowApp2 Lower0 NO 10240-20479 LowApp2 Lower1 NO 10240-20479 LowApp2 NO 10240-20479 NO 10	312 NFORMATION OF CORRESPONDING AREA INFORMATION OF LOWER MANAGEMENT STRUCTURE STRUCTURAL IND STRUCTURE AREA INCTURE STRUCTURAL IND CO-10239 LowApp1 Lower1 Co-10239 LowApp1 Lower1 Co-10239 LowApp2 Lower0 Co-10239 LowApp2 Lower1 Co-10239 LowApp2 LowApp2 LowApp2 Lower1 Co-10239 LowApp2

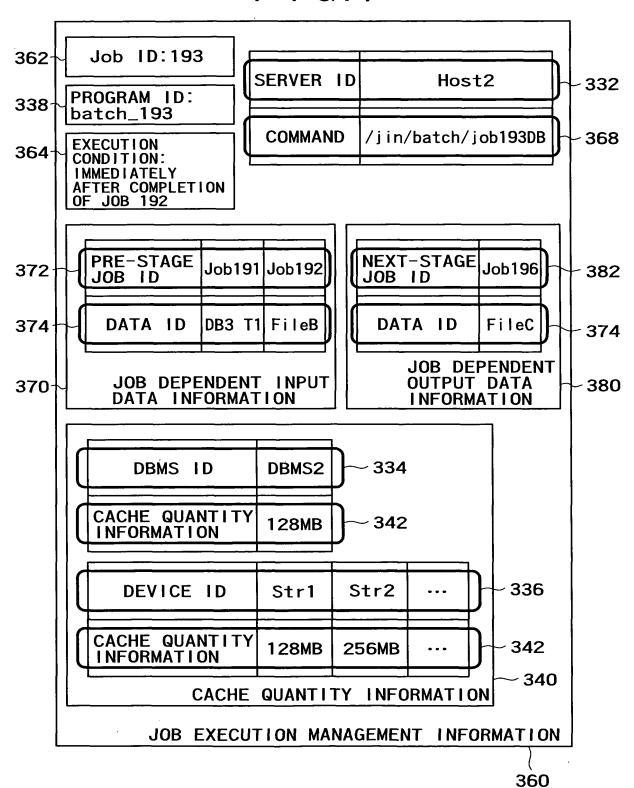
F I G. 4 510 514 512 DATA STORAGE POSITION NAME OF DATA STRUCTURE NAME OF **BLOCK NUMBER** DATA FILE PATH 0 - 499/dev/rdsk/Ivol0 T1 /dev/rdsk/Ivol0 2000-2499 **T2** /dev/rdsk/Ivol0 500-799 **T3** 500-799 /dev/rdsk/Ivol1 DATA STORAGE AREA INFORMATION

F I G.5

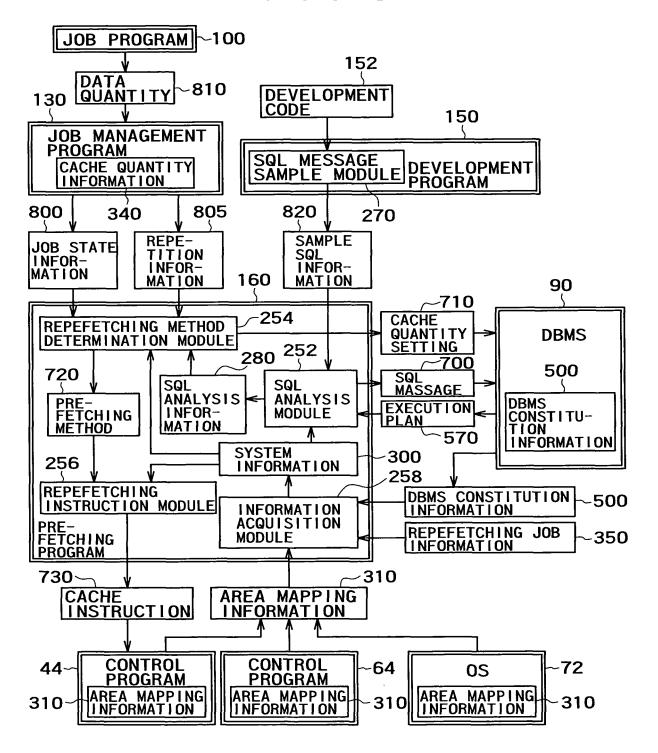


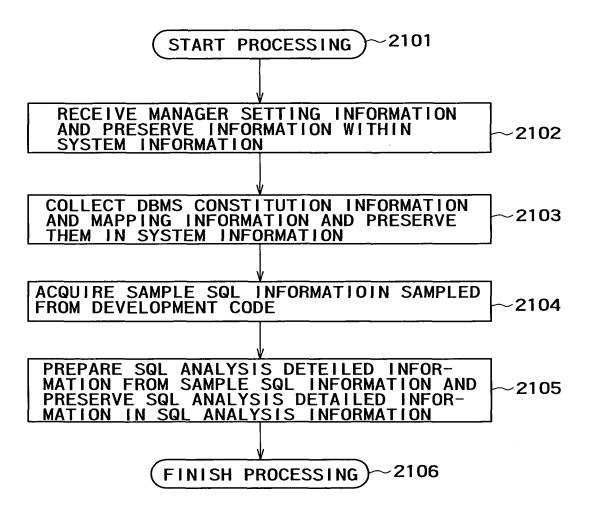
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3782
2898
1452 PAGES
(101, 102)
5.5

F I G.7

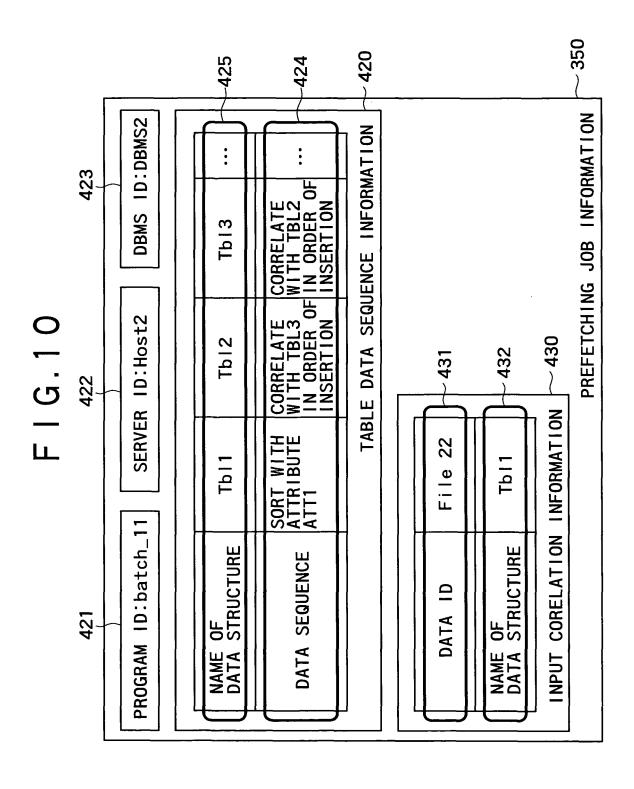


F I G.8



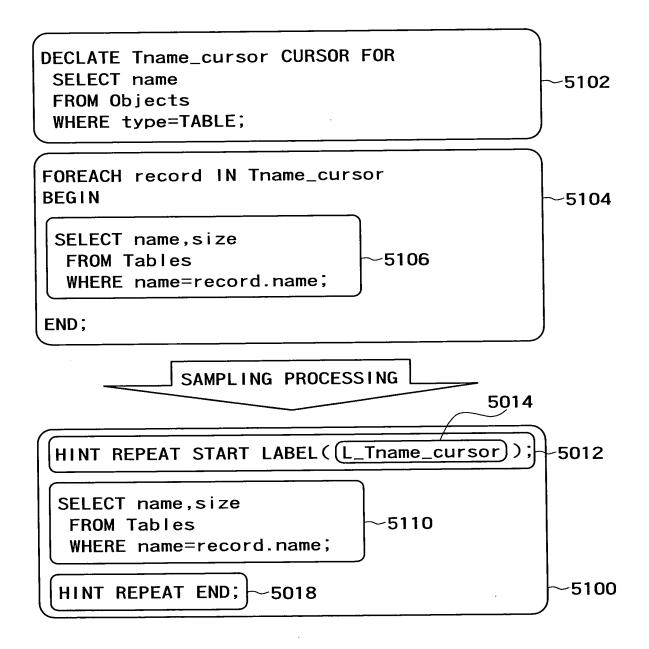


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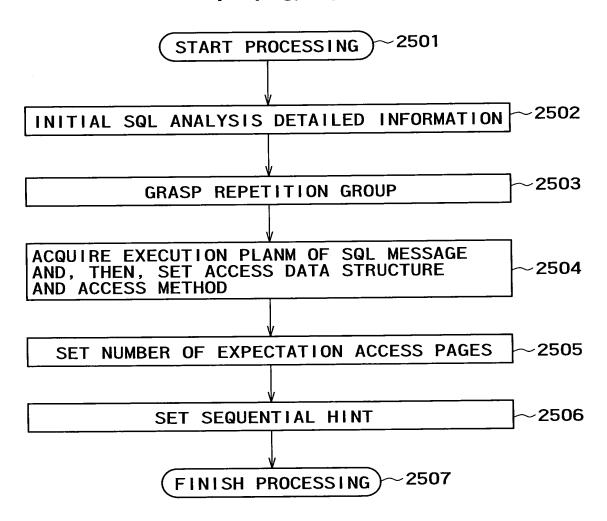


```
for(i=0;i < records;i++){
name=in_name[i]; addr=in_addr[i]; pay=i[i];
EXEC SQL SELECT C_ID,C_ID INTO:c_id,:c_d_id
FROM Cust
WHERE C_Name=:name and C_Addr=addr
FOR UPDATE;
                                            5002
EXEC SQL UPDATE Cust
SET C_Balance=C_Balance-:pay
WHERE C_ID=:c_id;
COMMIT;
           SAMPLING PROCESSING
                                      5014
HINT REPEAT START LABEL((L_records_1))
                                           5012
 SELECT C_ID,C_ID
 FROM Cust
 WHERE C_Name=:name and C_Addr=addr
 FOR UPDATE;
                                          15010
 UPDATE Cust
 SET C_Balance=C_Balance-:pay
 WHERE C_ID=:c_id;
 . . .
 COMMIT:
-5000
```

. . .



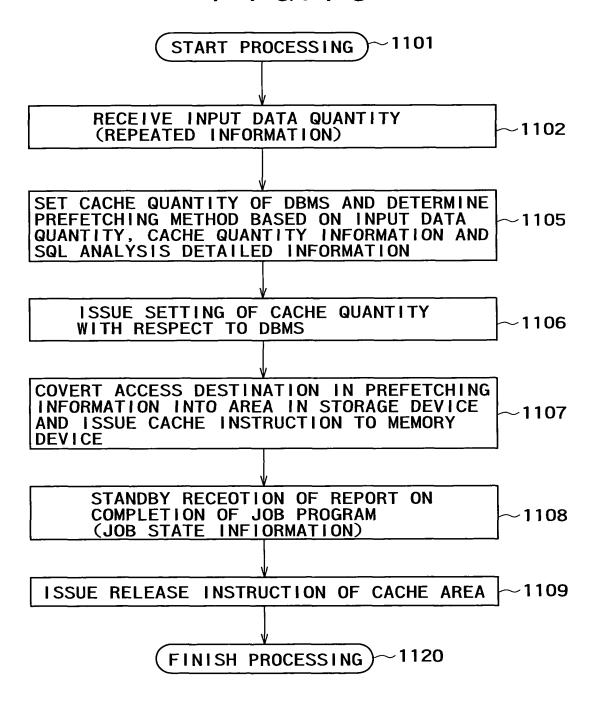
F I G. 13



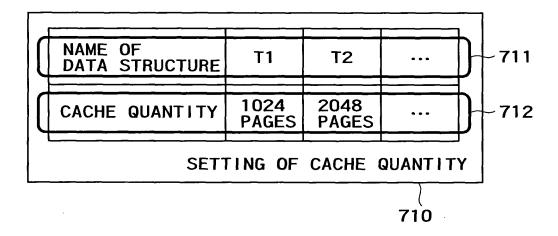
F1G.14		282	284	286	287	288		294	\sim 290
	~291	:			•			:	-ORMATI
	DBMS 1D:DBMS3	p_1		Т1	Ind-2-1	Index Access	4.5	-	SQL ANALYSIS DETAILED INFORMATION
		L_loop_1	1	DB8 T1	Т1	Table Access Full	I	Y	SQL ANALYS!
	PROGRAM ID:batch_11	REPETITION GROUP ID	ORDER OF EXECUTION	DRIVE DATA ID	NAME OF DATA STRUCTURE	ACCESS METHOD	NUMBER OF EXECUTION ACCESS PAGE	SEQUENTIAL HINT	
	281								

	Г											
	582	DETAIL OF NODE PROCESSING	Sum(T1,B)	T1,Key1=T3,Key1	T3, Key3=T4, Key4	_	_	T4,M<100	Key1=[RESULT OF N-3-1]	l	EXECUTION PLAN) 270
	578	ACCESS DATA STRUCTURE	1	Î	-	11	13	-	Ind1-1	T4		
F I G. 15	576	CONTENT OF NODE PROCESSING	wns	Nested Loop Join	Hash Join	Table Access by Index	Table Access Full	Filter	Index Access	Table Access Full		
	574	NAME OF PARENT NODE	root	N-1-1	N-2-1	N-2-1	N-3-1	N-3-1	N-3-2	N-4-2		
	572	NAME OF NODE	N-1-1	N-2-1	N-3-1	N-3-2	N-4-1	N-4-2	N-4-3	N-5-1		

F I G. 16



F I G. 17

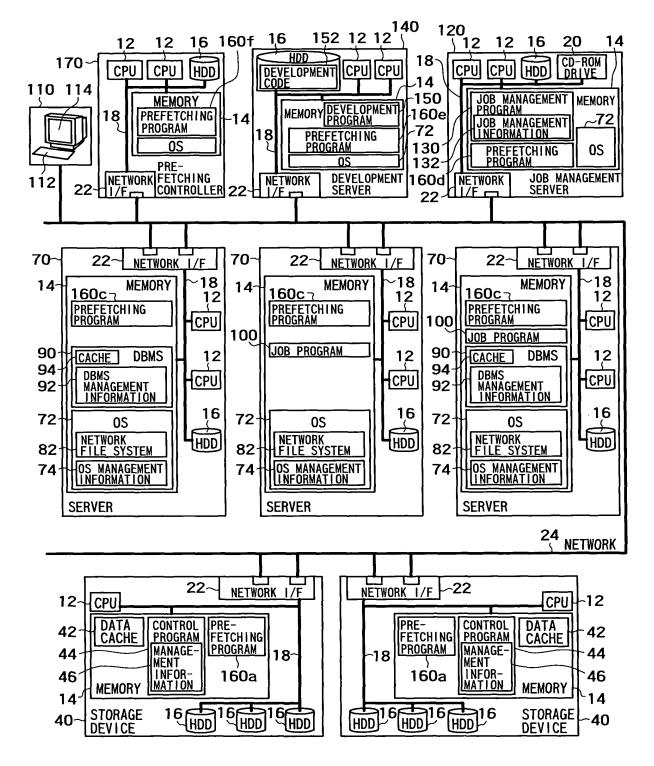


F I G. 18

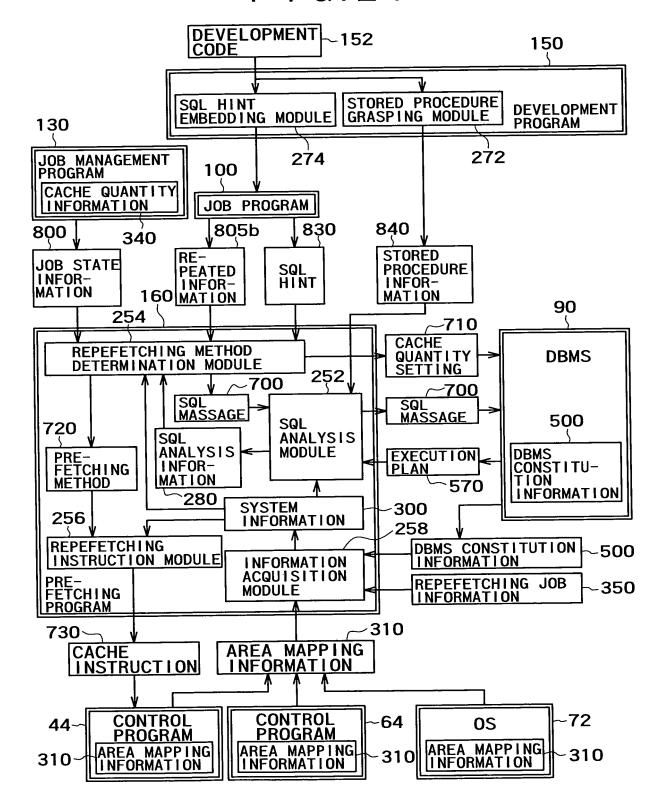
	NAME OF DATA STRUCTURE	Т1	Ind2-1		721
1		OFOUEN	111071117		
	CACHE METHOD	SEQUEN- TIAL	INSTANT PREFETCHING		722
	DRIVE ID	Str2	Str1	<u>}</u>	723
	CACHE QUANTITY	4MB	40MB	}	724
					}
	ACCESS ORDER	1	2	}	725
`					
			PREFETCHING	G METHOD	
				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_
				720	

т О

<u></u>	732	727	5	 735	 736	<u> </u>	737		
	:	:	:	÷	•••		:	CTION	730
	2	LUZ	81920-163839	I NSTANT PREFETCH I NG	40MB		2	CACHE INSTRUCTION	
	-	LU1	10240-819199	SEQUENTIAL	4MB		1		
	GROUPING	VIRTUAL STRUCTURE DATA IDENTIFIER	AREA AREA	САСНЕ МЕТНОВ	CACHE QUANTITY		ACCESS ORDER		



F I G. 21



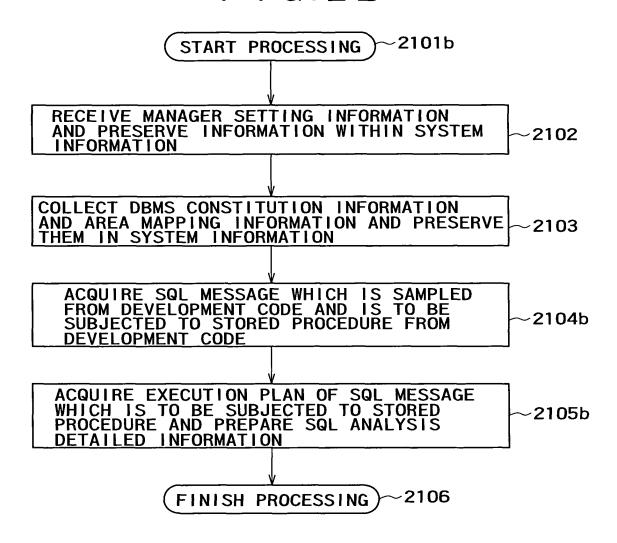


FIG.23

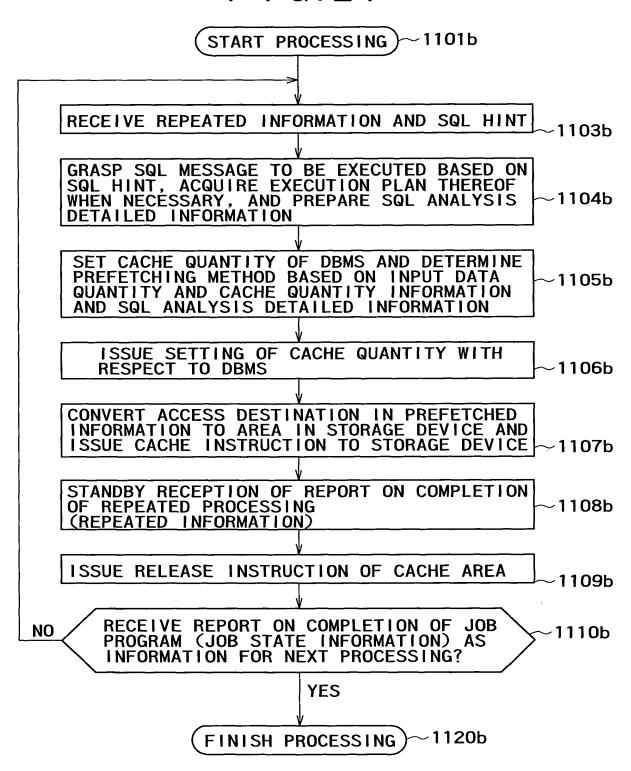
```
-5200
                              CREATE PROCEDURE (proc_pay) (IN name, IN address, IN pay)
                                                                                                        SELECT C_ID,C_ID INTO:c_id,d_id
FROM Cust
WHERE C_Name=:name and C_Addr=addr
                                                                                                                                                                                   DECLAREc_id NUMBER(10);
DECLAREc_d_id NUMBER(10);
5202
                                                                                                                                                      FOR UPDATE;
                                                                                                                                                                                                                                                COMMIT;
                                                                                                                                                                                                                                                                END
```

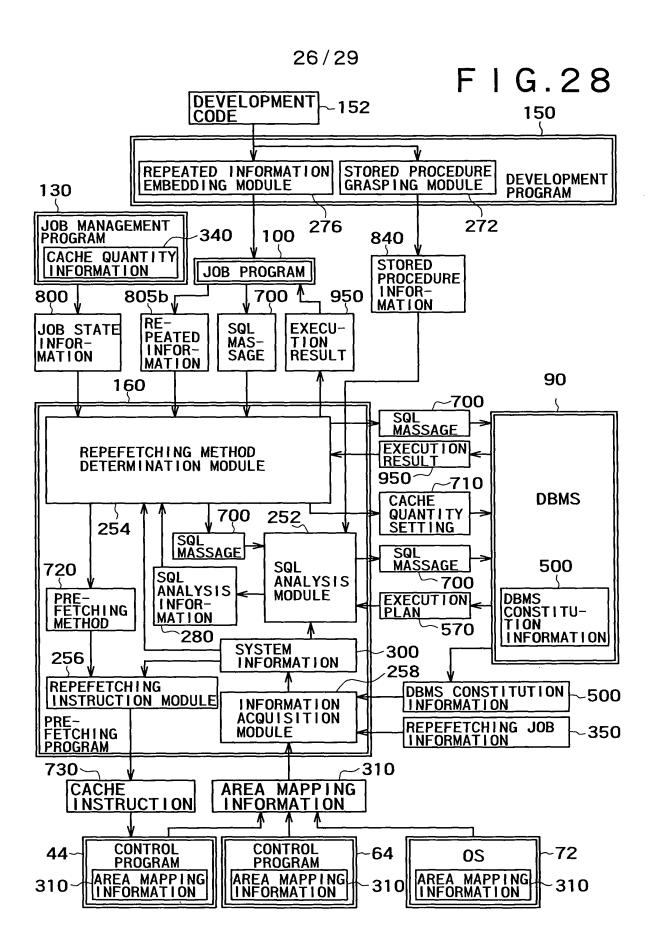
4 Z . 2 J	h_11 DBMS ID:DBMS3 ~ 291	TORED PROCEDURE:proc_pay 298	SAGE TO BE ANALYZED; PROCEDURE proc_pay (IN name, IN address, IN pay) 296	RE T1 Ind2-1	OD Table Access Full Index Access 388	TATION - 4.5	INT Y 294	SQI ANALYSIS DETAILED INFORMATION 290b
	PROGRAM ID:batch_11	NAME OF STORED PROCEDURE:proc_n	SQL MESSAGE TO BE ANALYZED; CREATE PROCEDURE proc_pay (IN name, IN add BEGIN COMMIT; END	NAME OF T1 T1	ACCESS METHOD Table Access Full	NUMBER OF EXPECTATION	SEQUENTIAL HINT Y	SOI ANA ISS

```
for(i=0;i<records;i++){
name=in_name[i]; addr=in_addr[i]; pay=i[i];
EXEC SQL SELECT C_ID,C_ID INTO:c_id,:c_d_id
FROM Cust
WHERE C_Name=:name and C_Addr=:addr
 FOR UPDATE:
                                              -5002
EXEC SQL UPDATE Cust
     C_Balance=C_Balance-:pay
 WHERE C_ID=:c_id;
COMMIT:
               HINT EMBEDDING
               PROCESSING
                                           5024
EXEC SQL HINT REPEAT START COUNT (; records;)
                                              ~5022
 EXEC SQL HINT EXEC_SQL
                                              ~5026
   SELECT C_ID,C_ID
   FROM Cust
   WHERE C_Name=dummy1 and C_Addr=dummy2
                                              - 5010
   FOR UPDATE:
   COMMIT;
for(i=0;i<records;i++){
name=in_name[i]; addr=in_addr[i]; pay=i[i];
EXEC SQL SELECT C_ID,C_ID INTO:c_id,:c_d_id
 FROM Cust
 WHERE C_Name=:name and C_Addr=:addr
 FOR UPDATE:
                                              -5002
EXEC SQL UPDATE Cust
 SET C_Balance=C_Balance-:pay
 WHERE C_ID=:c_id;
COMMIT:
EXEC SQL HINT REPEAT END; -5028
```

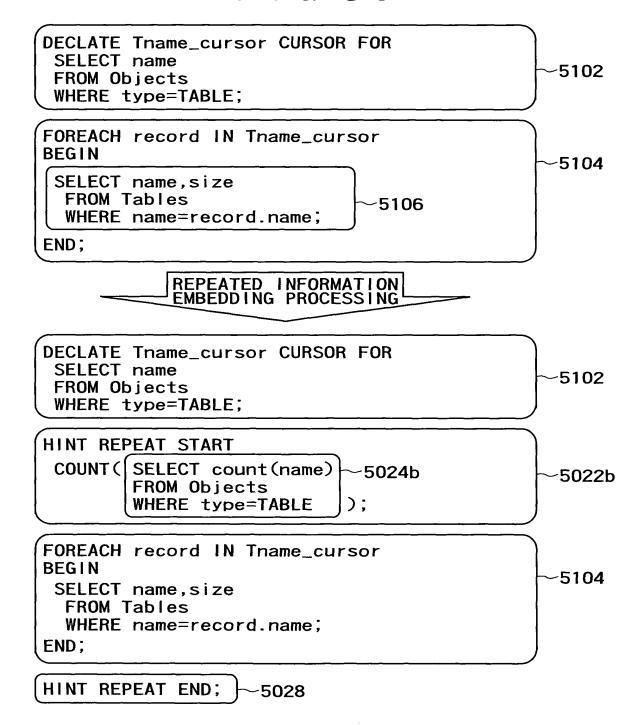
24/29

```
DECLATE Tname_cursor CURSOR FOR
 SELECT name
                                             -5102
 FROM Objects
 WHERE type=TABLE;
FOREACH record IN Tname_cursor
BEGIN
                                             ~5104
 SELECT name, size
  FROM Tables
                             ~5106
  WHERE name=record.name;
END;
               HINT EMBEDDING
               PROCESSING
DECLATE Tname_cursor CURSOR FOR
 SELECT name
                                             ~5102
 FROM Objects
 WHERE type=TABLE;
HINT REPEAT START
 COUNT(|SELECT count(name) |~5024b
                                              -5022b
        FROM Objects
        WHERE type=TABLE
                           );
 EXEC SQL HINT EXEC_SQL
   SELECT name, size
                            -5110
                                              -5026b
   FROM Tables
   WHERE name=record.name;
FOREACH record IN Tname_cursor
BEGIN
                                             ~5104
 SELECT name, size
  FROM Tables
  WHERE name=record.name;
END:
```





```
5002
for(i=0;i<records;i++){
name=in_name[i]; addr=in_addr[i]; pay=in_pay[i];
EXEC SQL SELECT C_ID,C_ID INTO:c_id,:c_d_id
 FROM
      Cust
 WHERE C_Name=:name and C_Addr=:addr
 FOR UPDATE:
EXEC SQL UPDATE Cust
 SET C_Balance=C_Balance-:pay
 WHERE C_ID=:c_id;
COMMIT;
            REPEATED INFORMATION EMBEDDING PROCESSING
                                                5022
                                         5024
EXEC SQL HINT REPEAT START COUNT (; records;)
for(i=0:i < records:i++){
name=in_name[i]; addr=in_addr[i]; pay=in_pay[i];
EXEC SQL SELECT C_ID,C_ID INTO:c_id,:c_d_id
 FROM Cust
 WHERE C_Name=:name and C_Addr=:addr
 FOR UPDATE;
EXEC SQL UPDATE Cust
 SET C_Balance=C_Balance-:pay
 WHERE C_ID=:c_id;
COMMIT;
EXEC SQL HINT REPEAT END; 5028
                                             5002
```



29/29 F I G. 31 START PROCESSING \sim 1201 RECEIVE REPEATED INFORMATION ~1202 RECEIVE SQL MESSAGE WHICH ISSUE AS ~1203 PROCESSING REQUEST 1204 SQL ANALYSIS DETAILED INFORMATION CORRESPONDING TO RECEIVED SQL MESSAGE PRESENT? **PRESENT** , NON-PRESENT ~1205 ACQUIRE EXECUTION PLAN OF RECEIVED SQL MESSAGE AND PREPARE SQL ANALYSIS DETAILED INFORMATION ∽1105c SET CACHE QUANTITY OF DBMS AND DETERMINE PREFETCHING METHOD BASED ON CACHE QUANTITY INFORMATION AND SQL ANALYSIS DETAILED INFORMATION -1106c ISSUE CACHE QUANTITY SETTING TO DBMS ∽1107c CONVERT ACCESS DESTINATION IN PREFETCHING INFORMATION TO AREA IN STORAGE DEVICE AND ISSUE CACHE INSTRUCTION TO STORAGE DEVICE ISSUE RECEIVED SQL MESSAGE TO DBMS, ACQUIRE PROCESSING RESULT AND RETURN PROCESSING RESULT TO JOB PROGRAM ~1209 RECEIVED REPORT ON COMPLETION OF REPEATED PROCESSING (REPEATED INFORMATION)? ~1210 NOT YET RECEIVED RECEIVED ~1211 ISSUE RELEASE INSTRUTION OF CACHE AREA RECEIVED REPORT ON COMPLETION OF JOB PROGRAM (JOB STATE INFORMATION)? -1212 NOT YET RECEIVED RECEIVED DELETE SQL ANALYSIS DETAILED INFORMATION -1213 WHICH BECOMES NO MORE NECESSARY

FINISH PROCESSING >~1214